

A RUSSIAN CONTRIBUTION TO ANTING AND FEATHER MITES

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FOR over a century anting by birds has intrigued and mystified observers, and many theories have been broached as to its function. In her thorough review of the subject, Whitaker (1957:260) points out that "No report of an autopsy of an anting bird could be found," and states (p. 195) that despite a bibliography of some 250 titles, "the purpose of the behavior remains unexplained." Simmons (1957:419) in his review writes, "The most popular theory is that anting is of some use 'in the destruction or discouragement of ecto-parasites' (Goodwin, 1955b), though there is still no positive evidence for or against." Papers published in the last five years have not changed the situation.

Yet autopsies had been made and experimental light shed on the function of anting in 1943 by the Russian parasitologist, Dr. V. B. Dubinin. His three large volumes on "Feather Mites" were published in 1951, 1953, and 1956. They were recently discovered by one of us (L. K.) and translations of pertinent passages shared with the other (M. M. N.). This monumental work appears to be unknown in America as well as in Great Britain, where Hughes (1959) regrets throughout his book the lack of information on the habits and life history of these creatures.

Vsevolod Borisovich Dubinin (11 January 1913–8 June 1958) was apparently built on the scale of a major biological scientist (Novikov, 1959). Besides the fields of invertebrate zoology, he was occupied with conservation, field exploration, teaching, and administrative work. He published 136 titles in which he described as new 10 families and subfamilies, 40 genera, and 150 species of parasites. More remarkable still, his research on the life cycles, physiology, and evolution of feather mites as detailed in the 1951 volume is apparently the most advanced extant.

Feather mites (Analgesoidea) lack mouth parts strong enough to chew feather substance and in some cases even lack anal openings to the alimentary tract. The suggestion, dating as far back as Trouessart (1884, cited by Dubinin) and more recently by Kelso (1952) that they feed on feather lipids (oils, fats) involves a crucial point in the physiology of both the feathers and their mite parasites. The existence on feathers of lipids other than those of the preen gland is now well established (Bolliger and Varga, 1961). Dubinin dealt with the food problem directly and thoroughly by microscopic examination of over 20,000 stomachs of 26 species of feather mites: he determined that the principal food of these parasites is lipid substance from the feathers.

Under the subject "Food of feather mites as an ecological factor," Dubinin

(1951:297-303) describes how he collected at different times of the year 33 Sky Larks (*Alauda arvensis*), 27 Carrion Crows (*Corvus corone*), and 28 Garganeys (*Anas querquedula*); counting the feather mites and extracting with ether the lipid substance from the primaries, secondaries, and greater wing coverts. He found this substance at its lowest point during the molt and in winter, at its highest after the molt and during the nesting season. The numbers of feather mites fluctuated in correspondence with the amount of lipid substance in the feathers.

In this connection, Mrs. Whitaker informs us that Starks (1951) found in Oklahoma that infestation of Red-winged Blackbirds (*Agelaius phoeniceus*) and Brown-headed Cowbirds (*Molothrus ater*) by both feather mites and lice was highest from May through July and lowest from December through February.

In the section, "Effects of avian anting on feather mites," Dubinin (1951: 205-210) gives a brief review of the literature on the subject. No Russian authors were listed, however, for nothing had been recorded in Russian. Dubinin, with his profound knowledge of feather mites, determined to try to find the function of this behavior. In June and July 1943, in Transbaical, four Transbaical Steppe Pipits (*Anthus pratensis godlewskii*) were watched on ant hills persistently seizing wood ants (*Formica rufa*) and smearing them on the wing feathers. After 20 to 40 minutes these birds were collected, as were four others not anting at the time.

"In the central area of five feathers of the birds, 12 interspaces between the barbs of the webs were filled with a whitish liquid with bits of chitin hanging on it. Located in these barbs were 54 mites, *Pterodectes bilobatus* Rob., which were found to be dead. Furthermore, separate drops of liquid (69 drops) were situated in other interspaces between barbs. In 33 of these 36 dead mites were found. The feathers had a noticeable odor of formic acid, retained in part for as long as 12 hours after the birds were collected. In the stomachs of all specimens and in the mouths of two were found remains of ants recently swallowed, in numbers almost coinciding to the number of insects smeared (84 individuals)."

The rest of the mites on the four pipits which had anted were crawling over the feather surfaces at random. On the four non-anting pipits, the mites remained undisturbed in rows in spaces between the barbs. "Of 642 live feather mites taken from the four anting pipits, 163 died within 12 hours, and 8 more within 24 hours. Simultaneously from the four control pipits taken at the same time from near their nests, 758 live *P. lobatus* were collected, of which only five died within 12 hours and two more within 24 hours."

These experiments constitute the first evidence that anting may destroy feather mites.

In northern Tadzhikstan on 25 September 1944, Dubinin watched two Hoopoes (*Upupa epops*) anting. "Seizing an ant the Hoopoe several times anointed one, then the other wing and, thrusting the head under the wing remained in this pose for one and a half to two minutes. Only once did I happen to see the bird after a minute of posing as above draw the bill with abrupt movements five times along the inner side of the wing feathers. A similar method of anting, not drawing the insect along the feathers but only holding the ant against them was noted by Groskin (1943:57) for the Scarlet Tanager (*Piranga erythromelas*). For 60 minutes I observed one Hoopoe perform such an action 32 times, and another, 19 times during 45 minutes." After collecting the birds, "Most of the feather mites (*Pterolichus cuculi*) found in motion were crawling over the web and the shaft of the feathers to the basal part covered by the under wing coverts. Collected in a container the mites showed no noticeably great decline; in 12 hours 1.7% of the individuals died; of the controls the total percent dying was 0.9 to 1.2."

This method of anting apparently disturbed the parasites but did not destroy them. We have quoted Dubinin's description in detail because it appears to be the first record of anting for the Hoopoe and for the Coraciiformes.

"The same method of anting" was seen in the Jay (*Garrulus glandarius glandarius*) and Rusty-headed Jay (*G. g. brandtii*). "For 12 to 20 minutes the jays, with half-drooping wings sat on paths where ants (*Formica rufa*) were crawling and in turns seizing and holding the insect against the inner side of the primaries." The feather mites on these birds were *Proctophyllodes glandarius*.

In his 1956 volume (pp. 79-82), Dubinin writes that in years with early spring thaws certain grouse experience a pronounced increase in mites while still carrying their dense winter plumage. The birds then seek relief from the irritation by the mites through scratching, dust bathing, and anting. He quotes field notes of A. N. Formozov on Black Grouse (*Lyrurus tetrrix*) in April 1951, and Hazel Hens (*Tetrastes bonasia*) in April 1953 "bathing" in anthills of *Formica rufa*, the materials of which were too coarse and too moist for "dusting," but overrun with ants. He regards these as instances of anting.

Dubinin called for more observations and careful experiments. His opinion is divided between the effect of anting on parasites and its effect as a special treatment, "cultivating" or "nursing" of those feathers most necessary for birds' flight. He also suggests that it might counteract or clean the oxidizing lipid film from the feathers.

As to the fact that so many anting birds have been reported as free of mites, it may well be that these parasites were at times present but were overlooked, since they are scarcely to be seen without careful examination with a strong hand lens.

We suggest that anting is an instinctive action present in many birds, perhaps aimed at defense against feather mites. It appears to be "triggered" by the acid or burning taste of ants and other substances and apparently may be performed *in vacuo*, i.e., in the absence of mite infestation.

SUMMARY

V. B. Dubinin collected nine birds of three species which he had watched anting. All were infested with feather mites. Of the 732 mites on the four anting Steppe Pipits, 90 were dead and 163 others died within 12 hours; of the 758 taken from four non-anting pipits only five died within the same period. These experiments apparently provide the first autopsies performed on anting birds, as well as the first evidence that anting sometimes destroys feather mites. They also give what appears to be the first record of anting in the Hoopoe and in the Coraciiformes.

Translations of the two sections on anting, of those on "Food of feather mites" and "Methods of collecting, counting and examination for feather mites," and of the three-page table of contents of Dubinin's 1951 volume have been donated to the Van Tyne Memorial Library at The University of Michigan at Ann Arbor.

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